

1 **"ASSET RECOVERY DEVICE"**
2

3 **FIELD OF THE INVENTION**

4 The present invention is concerned with a method and system to
5 promote the prompt return of a lost asset. More specifically, the present
6 invention relates to a device that aids in the recovery of lost pets, lost children
7 or lost personal items as but a few examples of the application of the present
8 invention.

9
10 **BACKGROUND OF THE INVENTION**

11 Statistics show that the majority of lost pets or children are not
12 recovered by police, veterinarians, animal shelters, or humane societies, but
13 rather by the owner's friends or neighbors. This also applies to lost inanimate
14 objects. It stands to reason then that, the faster the asset is found, the sooner
15 it can be returned to its owner.

16 There is a need, not satisfied by the prior art, for a system that
17 uses "speech" emitted from the asset itself to alert the public that it is lost. For
18 example, a person is more likely to go to the assistance of a crying child than
19 to one that is quietly walking down the sidewalk. It is desirable to shorten the
20 time that an asset is lost and enhance its probability of being found and
21 returned. It is also desirable to give the asset the power of self-notification
22 and to draw upon the innate human desire to assist those demonstrating
23 distress. The present invention addresses the shortcomings in the prior art to
24 aid in the recovery of lost assets.

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SUMMARY

This invention relates to a system that emits and receives a signal that serves to activate alarm mechanisms to alert both the owner of a lost asset and the public at large that the asset is astray and may be in need of assistance. The system fulfills the unmet need for proactive loss notification through a unique combination of RF transceivers and voice record/playback technologies.

These assets may include lost pets, young children, suitcases, and any other personal items. The invention makes use of electronic components such as wireless radio frequency transceivers and voice recording/playback chips to notify the general public at large that an asset is lost and to notify the owner of asset that the asset is lost.

The system of the present invention comprises two basic components: an asset tag that attaches to the asset and a base station that it is positioned near the asset owner. The asset tag consists of a wireless radio frequency transceiver, an antenna, a voice recording and playback circuit with speaker, a logic control circuit or controller to control the transceiver and voice recording/playback circuit, a battery-based power supply, a power indicator, control buttons to control the functions of the logic controller and the voice recording/playback circuit and a weather resistant housing to protect the electronics contained therein. The asset tag is designed to be small, lightweight and easy to attach to the asset.

The base station consists of a wireless radio frequency transceiver complementary to the transceiver in the asset tag, an antenna, an

1 alarm playback circuit, a logic control circuit or controller to control the
2 transceiver and the alarm playback circuit, a power supply that may use either
3 batteries or an external battery eliminator such as an AC/DC power adapter,
4 control buttons to control the functions of the logic controller and the alarm
5 playback circuit and a weather resistant housing to protect the electronics
6 contained therein. The housing may be designed to be a desk-top box or a
7 small, ergonomically designed enclosure similar to a cell-phone or walkie-
8 talkie that can be easily carried in a pocket, a purse or clipped onto a belt.

9 The transceiver circuits are readily available radio frequency
10 transceiver integrated circuit devices that are commonly used in wireless
11 pagers, cell-phones or family radio service walkie-talkies and are well known
12 to those skilled in the art. Conceivably, wireless radio frequency transceivers
13 used in global positioning systems ("GPS") devices could be used as well.

14 The logic controllers are, preferably, microprocessors or micro-
15 controllers having the capability to contain a software program to control the
16 operation of the asset tag and base station electronics, as the case may be.
17 The asset tag and base station will have their logic controllers programmed
18 with an identification code that is unique to a specific asset tag. Alternatively,
19 the asset tag and base station may have a set of "dip switches" that allows the
20 owner to manually select an identification code for the asset.

21 The voice recording/playback circuit consists of readily available
22 consumer electronic integrated circuit devices that are well known to those
23 skilled in the art. The circuit allows the owner to record their own
24 personalized message that will be played by the asset tag if the asset

1 becomes lost. Preferably, this circuit will have the capability to record and
2 playback two such personalized alarm messages. The asset tag will
3 preferably have a record button to activate the recording functionality of the
4 asset tag. The first alarm message will simply be an alert message indicating
5 to the public at large that the asset is lost. Preferably, the voice
6 recording/playback circuit will allow up to 20 seconds of recording time for the
7 first alarm message. The second alarm message capability allows the owner
8 to record a more detailed message with information about the asset and how
9 to return the asset to its owner. Preferably, the circuit will allow up to 60
10 seconds of recording time for the second alarm message.

11 The second message is played when a person who locates the
12 lost asset presses a playback button on the asset tag. The asset tag itself will
13 preferably have a printed message on the housing directing the person who
14 finds the asset to press the playback button for further information. For
15 example, the first message may simply be, "Help me, I'm lost!" The second
16 message could be, "I belong to Jane Doe. Please call Jane at 555-1234 to
17 return me to Jane". The ability to record personalized messages leaves the
18 content of the messages up to the owner to determine and record.

19 The alarm playback circuit of the base station may be as simple
20 as a beep or buzzer to alert the owner that the asset is lost. This circuit could
21 also have the capability to record and playback a personalized message
22 indicating that the asset is lost.

23 The asset tag power supply is preferably battery-based. The
24 asset tag is preferably lightweight and small in size so that it may easily clip

1 onto a pet collar, a piece of luggage or to the clothing of a young child.
2 Preferably, watch or hearing-aid batteries would be used in the asset tag to
3 keep the size and weight of the asset tag to a minimum.

4 The base station power supply may use either batteries or a
5 battery-eliminator such as an AC/DC adapter that are readily available and
6 well known to those skilled in the art. The base station can be larger in size
7 than the asset tag, similar in size to a family radio service-type walkie-talkie.
8 The base station may be carried by the owner in their pocket or purse or
9 clipped onto their belt.

10 In operation, the system works by synchronizing the asset tag
11 with the base station. The base station, on a periodic basis, will transmit a
12 radio signal that contains an unique identification code that corresponds to the
13 asset. The base station will transmit the signal in a repetitive fashion, for
14 example, ten times a second.

15 The asset tag listens for the radio signal from the base station.
16 The asset tag receives the radio signal and compares the identification code
17 in the signal with the unique identification code programmed in the asset tag.
18 To conserve power at the asset tag, the asset tag's transceiver may be
19 controlled by the asset tag's logic controller to turn the transceiver on to listen
20 for the base station radio signal for only a fraction of the time when the base
21 station is transmitting its radio signal. For example, the asset tag will turn the
22 transceiver on for one-tenth of a second every second. If the comparison of
23 the identification codes results in a match, then the asset tag will "check-in" or

1 synchronize with the base station by transmitting a radio frequency signal with
2 the asset tag's unique identification code.

3 If the asset tag does not receive the radio signal from the base
4 station within a predetermined period of time or if the comparison of the
5 identification codes does not result in a match, then the asset tag will play the
6 first alarm message indicating that the asset is lost. When the first alarm
7 message attracts the attention of a person near the asset, that person may
8 activate the second alarm message by pressing the playback button on the
9 asset tag. The second alarm message will play the additional information
10 recorded by the owner on how to contact the owner or to return the asset to
11 the owner, depending on what the owner recorded as the second alarm
12 message.

13 The base station receives the synchronization signal from the
14 asset tag and compares the identification code in the asset tag radio signal
15 with the identification code sent by the base station. If the comparison results
16 in a match, the base station repeats the synchronization process cycle. If the
17 base station does not receive the synchronization radio signal from the asset
18 tag within a predetermined period of time, preferably in the range of 10
19 seconds (if used with a young child) to 15 minutes (if used with a pet in the
20 backyard), or if the comparison of the identification codes does not result in a
21 match, then the base station will activate its alarm circuit to alert the owner
22 that the asset has moved out of the synchronization range. The base alarm
23 message may be a beeper or buzzer. Alternatively, the base station may
24 include its own voice message recording and playback mechanism to permit

1 the owner to record a personalized alarm message to indicate that the asset
2 is out of "sync range".

3 The purpose of the system is to inform the owner of the asset
4 when the asset is no longer within a predetermined proximity or distance from
5 the base station. The distance or threshold in which alarms are generated is
6 determined by the frequency and signal strength of the radio frequency signal
7 transmitted by the transceiver circuits in both the asset tag and the base
8 station. The alarm threshold distance will be the distance between the asset
9 tag and the base station in which the signal strength becomes weak enough
10 so as to not be detected by the transceiver circuit. The threshold distance is
11 selectable and is preferably adjustable from as little as 2 meters (for use with
12 a young child) to as much as 200 meters or more (for use with a pet in the
13 backyard). The threshold or "sync range" is a function of the frequency of the
14 radio signal, the antennas used on both the asset tag and base station and
15 the power strength of the radio signal itself.

16 The system was originally conceived to have one base station
17 and one asset tag thereby requiring a unique base station for each unique
18 asset tag. However, another embodiment of the present invention has a
19 system with one base station that can work with a number of different and
20 unique asset tags and, therefore, monitor a number of assets by transmitting
21 and receiving a number of unique predetermined identification signals on a
22 cyclic basis to keep track of a number of unique assets.

23 Broadly stated, one aspect of the present invention is a method
24 for identifying a lost asset, the method comprising the steps of periodically

1 transmitting a first predetermined identification signal from a base station, the
2 first predetermined identification signal unique to the asset, each transmission
3 of the first predetermined identification signal separated by a first
4 predetermined period of time, receiving the first predetermined identification
5 signal at an asset tag attached to the asset, the asset tag having a
6 predetermined identification code unique to the asset, comparing the first
7 predetermined identification signal with the predetermined identification code
8 of the asset at the asset tag, synchronizing the asset tag to the base station
9 by transmitting a second predetermined identification signal from the asset tag
10 if the first predetermined identification signal matches the predetermined
11 identification code of the asset, the second predetermined identification signal
12 containing the predetermined identification code of the asset, generating a
13 first alarm message at the asset tag indicating that the asset is lost if the first
14 predetermined identification signal does not match the predetermined
15 identification code of the asset or if the first predetermined identification signal
16 is not received after a first predetermined period of time, receiving the second
17 predetermined identification signal at the base station, comparing the second
18 predetermined identification signal with the first predetermined identification
19 signal at the base station, and generating a base alarm message at the base
20 station indicating that the asset is lost if the predetermined identification code
21 of the asset contained in the second predetermined identification signal does
22 not match the first predetermined identification signal or if the second
23 predetermined identification signal is not received after a second
24 predetermined period of time.

1 Broadly stated, another aspect of the present invention is a
2 system for identifying a lost asset, comprising means for transmitting a
3 predetermined identification signal from a base station, the first predetermined
4 identification signal unique to the asset, means for receiving the first
5 predetermined identification signal at a asset tag attached to the asset, the
6 asset tag having a predetermined identification code unique to the asset,
7 means for comparing the first predetermined identification signal with the
8 predetermined identification code of the asset, means for synchronizing the
9 asset tag to the base station by transmitting a second predetermined
10 identification signal from the asset tag if the first predetermined identification
11 signal matches the predetermined identification code of the asset, the second
12 predetermined identification signal containing the predetermined identification
13 code of the asset, means for generating a first alarm message at the asset tag
14 indicating that the asset is lost if the first predetermined identification signal
15 does not match the predetermined identification code of the asset or if the first
16 predetermined identification signal is not received after a first predetermined
17 period of time, means for receiving the second predetermined identification
18 signal at the base station, means for comparing the second predetermined
19 identification signal with the first predetermined identification signal at the
20 base station, and means for generating a base alarm message at the base
21 station indicating that the asset is lost if the predetermined identification code
22 of the asset contained in the second predetermined identification signal does
23 not match the first predetermined identification signal or if the second

1 predetermined identification signal is not received after a second
2 predetermined period of time.

3 Broadly stated, another aspect of the present invention is A
4 system for identifying a lost asset, comprising a base station having means for
5 assigning a predetermined identification code unique to the asset, a first
6 wireless radio frequency signal transceiver operatively connected to a base
7 station antenna, a first microprocessor operating a first software program
8 operatively connected to the first wireless radio frequency signal transceiver
9 and the means for assigning the predetermined identification code unique to
10 the asset, a base alarm message playback mechanism operatively connected
11 to the first microprocessor, a power supply operatively connected to the first
12 transceiver, the first microprocessor and the base alarm message playback
13 mechanism, a suitable enclosure for housing the elements of the base station
14 listed above whereby the base station is capable of transmitting a first
15 predetermined identification signal unique to the asset, receiving a second
16 predetermined identification signal containing a predetermined identification
17 code of an asset, comparing the first predetermined identification signal with
18 the predetermined identification code contained in the second predetermined
19 identification signal and generating a base alarm message if said
20 predetermined identification code does not match the first predetermined
21 identification signal or if the second predetermined identification signal is not
22 received within a first predetermined period of time; and an asset tag having
23 means for assigning a predetermined identification code unique to the asset
24 tag, a second wireless radio frequency signal transceiver operatively

1 connected to an asset tag antenna, a second microprocessor operating a
2 second software program operatively connected to the second wireless radio
3 frequency signal transceiver and the means for assigning the predetermined
4 identification code of the asset tag, an asset tag alarm message recording
5 and playback mechanism operatively connected to the second
6 microprocessor, the alarm recording and playback mechanism adapted to
7 record and playback a first alarm message, a power supply operatively
8 connected to the second transceiver, the second microprocessor and the
9 alarm message recording and playback mechanism, a suitable enclosure for
10 housing the elements of the asset tag listed above and attaching to an asset
11 whereby the asset tag is capable of receiving the first predetermined
12 identification signal, comparing the first predetermined identification signal
13 with the predetermined identification code of the asset tag, synchronizing with
14 the base station by transmitting the second predetermined identification signal
15 containing the predetermined identification code of the asset tag if the first
16 predetermined identification signal matches the predetermined identification
17 code of the asset tag and generating the first alarm message if the first
18 predetermined identification signal does not match the predetermined
19 identification code of the asset tag or if the first predetermined identification
20 signal is not received within a second predetermined period of time.

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1 BRIEF DESCRIPTION OF THE DRAWINGS

2 Figure 1 is a block diagram of the system of the present
3 invention.

4 Figure 2 is an illustration of the asset tag of the system of the
5 present invention.

6 Figure 3 is an illustration of the base station of the system of the
7 present invention.

8 Figure 4 is an illustration of the synchronization process
9 between the asset tag and the base station of the present invention.

10 Figure 5 is a flow chart of the synchronization process followed
11 by the asset tag of the system of the present invention.

12 Figure 6 is a flow chart of the synchronization process followed
13 by the base station of the system of the present invention.

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15 DETAILED DESCRIPTION OF THE EMBODIMENTS

16 Referring to Figures 1, 2 and 3, therein illustrated is the system
17 of the present invention, in which the asset tag and a base station
18 communicate through RF transmission to synchronize the asset tag with the
19 base station. When the tag has not been synchronized, it is placed into a
20 mode in which a recorded first alarm message is played from the unit,
21 indicating the asset is lost and needs help. The tag can record and store a
22 personalized message from the asset's owner, which is played when it fails to
23 synchronize. When the asset is located by a person, the asset tag has a
24 printed notice directing the person to press the playback button which causes

1 the asset tag to play a recorded second alarm message which will provide
2 further information about the asset and how to return the asset to its owner.

3 In a preferred embodiment, asset tag **1** may include (but will not
4 be restricted to contain) a voice-recording circuit **2** with playback capability
5 that, via a speaker **3**, will notify the public at large that the asset its attached to
6 is lost; a transceiver **4** that synchronizes and/or otherwise "checks in" with a
7 base station transceiver **8**; and a logic controller **6** or similar device or logic
8 that allows for the activation of voice notification should the synchronization
9 not occur within a specified amount of time. In addition, the use of batteries or
10 related power supplies **7** may be used to energize the circuits.

11 As shown in Figure 2, asset tag **1** has function button **14** to
12 control the record and playback capabilities of asset tag **1**. The first and
13 second alarm messages are played back through speaker **3**. Light emitting
14 diode ("LED") **20** indicates that asset tag **1** is powered up. Playback button
15 **16**, when pressed, activates the playback of the second alarm message.
16 Antenna **18** receives and transmits the radio synchronization signals between
17 asset tag **1** and base station **5**.

18 In a preferred embodiment, a base station **5** may include (but
19 will not be restricted to contain) a transceiver **8** that synchronizes and/or
20 otherwise "checks in" with the asset tag transceiver **4**, and logic controller **9**
21 or similar device or logic that allows for the activation of alarm playback
22 mechanism **10** such as an internal alarm to notify the owner that the asset tag
23 has not "checked in" within a specified period of time.

1 Alarm playback mechanism **10** is comprised of an integrated
2 circuit (not shown) that generates an alarm beep or tone when asset tag **1** has
3 lost synchronization with base station **5**. The integrated circuit is connected to
4 an audio amplifier (not shown) to amplify the alarm beep or tone to be
5 reproduced on speaker **26**. In an alternative embodiment, alarm playback
6 mechanism **10** may include an integrated circuit with the capability record,
7 store and playback a voice message as the base alarm message to alert the
8 owner that asset tag **1** has lost synchronization with base station **5**.

9 The use of batteries or related power supplies **11** may be used
10 to power the unit when it is used in a portable manner. As well, a detachable
11 power-supply **12** that can plug the unit into a standard home AC power outlet
12 may be used through power connection **30**. LED **24** indicates that base
13 station **5** is powered up.

14 Figure 4 illustrates the conceptual synchronization process of
15 the present invention. Base station **5** transmits base station signal **32** from
16 antenna **22**. Asset tag **1** receives base station signal **32** via antenna **18**.
17 Upon receiving base station signal **32**, asset tag **1** synchronizes with base
18 station **5** by transmitting asset tag signal **34**. When base station **5** receives
19 asset tag signal **34**, base station **5** will then cyclically repeat the
20 synchronization process.

21 If asset tag **1** does not receive base station signal **32**, it means
22 that asset tag **1** has moved out of the synchronization range of base station **5**.
23 This range is adjustable by varying the signal power of the radio signals used
24 by the system. The range is preferably from 5 meters to 100 meters. If asset

1 tag 1 becomes out of sync with base station 5, it will then play the first alarm
2 message from speaker 3. A passerby, hearing the first alarm message, may
3 investigate the source of the alarm message and locate the asset and asset
4 tag 1. Message 17 printed on asset tag 1 will direct the passerby to press
5 playback button 16 which will cause asset tag 1 to play the second alarm
6 message that contains further information regarding the asset. As the alarm
7 messages are recorded by the owner, the owner can record any pertinent
8 information regarding the asset to effect the return of the asset to the owner.
9 Likewise, if base station 5 stops receiving asset tag signal 34, base station 5
10 will then play its base alarm message on speaker 26 to alert the owner that
11 the asset is now out of synchronization range with base station 5.

12 Figure 5 is a flow chart that depicts the system logic in detail for
13 the synchronization of the asset tag 1 and the resultant effect of a loss of
14 synchronization. At step 202, the base station 5 emits an identification
15 number signal (through, for example an RF link) to the asset tag 1. In a
16 preferred embodiment, the base station 5 may send the identification number
17 ten times per second. In a preferred embodiment, the asset tag 1 can listen
18 for the identification number for one-tenth of a second once every second in
19 order to save power.

20 Step 202 is followed by step 204, in which the asset tag 1
21 receives the identification number. If the identification number is not received
22 a certain number of times (such as once, twice, etc.), the "NO" branch is
23 followed to step 212 wherein the asset tag 1 will play a pre-recorded voice
24 message. In step 214 if a stopping mechanism (such as a stop button) is not

1 activated the "NO" branch is followed and the voice message repeats
2 continuously. If the stopping mechanism is activated then the "YES" branch is
3 followed to **step 216**. At **step 216**, the voice message stops playing and the
4 asset tag **1** listens for the identification number sent by the base station **5**. If
5 the identification number is received, the "YES" branch is followed to **step 204**
6 where the process starts over. If the identification number is not received,
7 then the "NO" branch is followed and the asset tag **1** waits until it receives the
8 identification number.

9 Referring back to **step 204**, if the identification number is
10 received, the "YES" branch is followed to **step 206**. If the stopping
11 mechanism is activated at **step 206** the "YES" branch is followed to **step 208**
12 wherein the asset tag **1** will play the pre-recorded voice message once before
13 proceeding to **step 210**. If the stopping mechanism is not activated at **step**
14 **206**, the "NO" branch proceeds directly to **step 210**. At **step 210**, the asset
15 tag **1** waits a predetermined period of time (such as one-half second, one
16 second, etc.), before returning back to **step 204**.

17 Referring now to Figure 6, depicted therein is a flow chart of the
18 system logic in detail for the synchronization of the base unit **5** and the
19 resultant effect of a loss of synchronization. In **step 302**, the base station **5**
20 emits an identification number signal (through, for example, an RF link) to the
21 asset tag **1**. In **step 304**, the asset tag **1** receives the identification number.
22 In **step 306**, the asset tag **1** sends its own identification number to the base
23 station **5**. At **step 308**, the base station **5** waits to receive the identification
24 number from the asset tag **1**. If the base station **5** receives the asset tag's

1 identification number continuously for a predetermined number of seconds
2 (such as one, two, etc.), the "YES" branch is followed to **step 310**. At **step**
3 **310**, the asset tag **1** waits a predetermined period of time (such as one-half
4 second, one second, etc.), before returning back to **step 302**.

5 If the base station **5** does not receive the asset tag's
6 identification number continuously for a predetermined number of seconds,
7 the "NO" branch is followed to **step 312** wherein the base station **5** sounds an
8 alarm. If the stopping mechanism in **step 314** is activated, the "YES" branch
9 is followed to **step 302** and the process starts over again. If the stopping
10 mechanism in **step 314** is not activated the "NO" branch is followed and the
11 alarm will ring continuously until the stopping mechanism is activated.

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13 Although a few preferred embodiments have been shown and
14 described, it will be appreciated by those skilled in the art that various
15 changes and modifications might be made without departing from the scope
16 of the invention. The terms and expressions used in the preceding
17 specification have been used herein as terms of description and not of
18 limitation, and there is no intention in the use of such terms and expressions
19 of excluding equivalents of the features shown and described or portions
20 thereof, it being recognized at the scope of the invention as defined and
21 limited only by the claims that follow.

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